

**HIGHWAY HIGHLIGHTS OF 1956
AND THE CHALLENGE AHEAD**

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**PURDUE UNIVERSITY
LAFAYETTE INDIANA**

by

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HIGHWAY HIGHLIGHTS OF 1956 AND THE CHALLENGE AHEAD

TO: K. B. Woods, Director
Joint Highway Research Project

June 12, 1957

FROM: H. L. Michael, Assistant Director

File: 14-5

Attached is a paper entitled, "Highway Highlights of 1956 and the Challenge Ahead," by A. K. Branham, research associate on our staff. This paper was presented at the 39th Annual Tennessee Highway Conference April 11-12, 1957.

The paper includes a discussion of the Federal Highway Act of 1956 and the development of highways during 1956. It also presents some of the obstacles to building a highway system that will accommodate the large volumes of traffic expected for the future.

Respectfully submitted,

Harold L. Michael

Harold L. Michael, Secretary

HLM:hgb

Attachment

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HIGHWAY HIGHLIGHTS OF 1956 AND THE CHALLENGE AHEAD

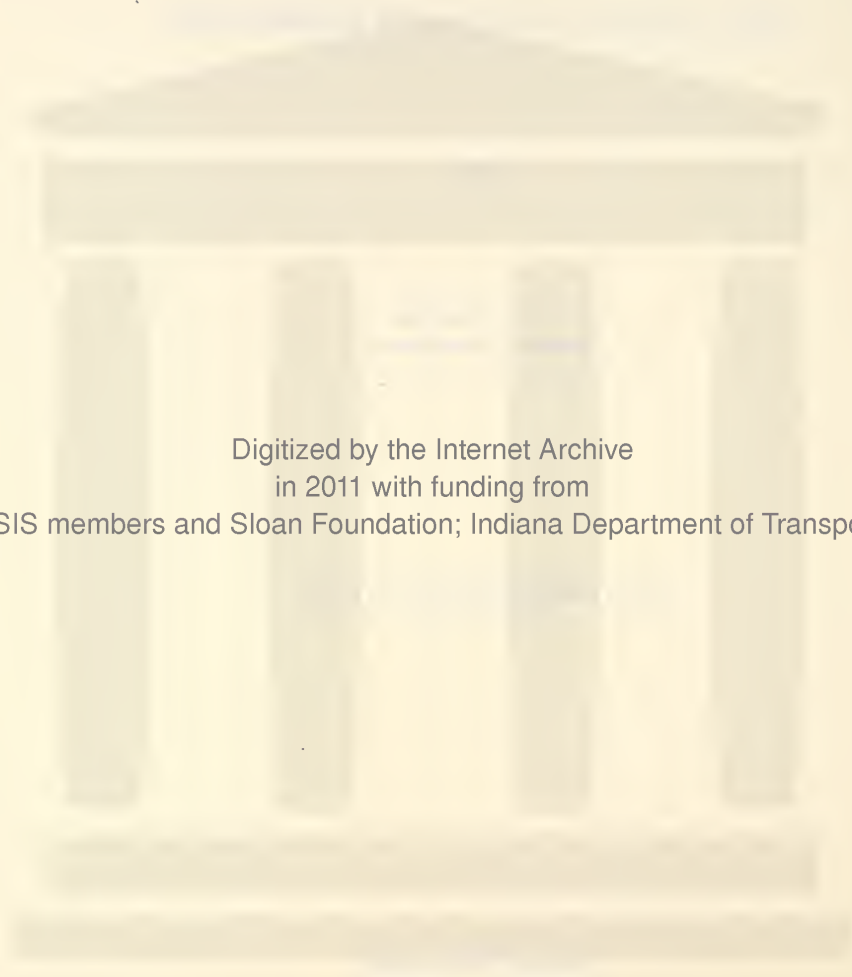
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Purdue University
Lafayette, Indiana

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HIGHWAY HIGHLIGHTS OF 1956 AND THE CHALLENGE AHEAD*

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INTRODUCTION

The title of this discussion "Highway Highlights of 1956 and the Challenge Ahead" implies content of many types - historical, existing, formulative, and speculative. It refers to past and future development of a highway system of about 3.4 million miles over which more than 65 million motor vehicles, including nearly 11 million trucks, traveled approximately 600 billion vehicle miles in 1956. It also refers to some of the obstacles to be encountered in improving the system to withstand the predicted 81 million motor vehicles in 1965, and more in 1975.

ACTION BY FEDERAL GOVERNMENT

The action of the Federal Government in 1956 to squarely meet the problem of an inadequate and inefficient highway system overshadowed all other public developments, except military, during a year of accelerated expenditures at all levels of government. The size of the planned construction program and the precedents established by the Federal Highway Act of 1956 will have a significant effect upon highway development and upon the economy of the United States. The Act went into effect on July 1, 1956 as Public Law 627 of the 84th Congress, and authorized the largest peacetime public works program in the history of the United States. The Act allocates funds for all federal-aid road networks and

* Presented at the 39th Annual Tennessee Highway Conference, Knoxville, Tennessee, April 11-12, 1957.

the federal roads with primary emphasis on the completion of the 41,000 mile National System of Interstate and Defense Highways. This system, representing 1.2% of the Nation's total road mileage, will connect 42 state capitals (excluding Delaware, Maryland, Missouri, Nevada, N. Carolina and S. Dakota) and 90% of all cities over 50,000 population (209 of 237 cities, 1950 census.). It is to be constructed during the 13 year span of the Act (Fiscal years 1957-1969), and is to be adequate for the traffic demands of 1970.

THE MAJOR PROVISIONS OF THE FEDERAL HIGHWAY ACT OF 1956

1. It provides for an overall expenditure on interstate, primary, secondary, and urban systems, by both Federal and State Governments, of \$32.5 billion. Of this total, Federal Funds of \$25 billion are to be provided during the 13 year period (1957-1969) for the Interstate System and \$2.55 billion during the 3 year period (1957-1959) for the other Federal Aid Systems.

2. It provides that monies will be apportioned on the basis of 90 percent Federal - 10 percent State for the Interstate System, and 50 percent Federal - 50 percent State for other Federal-Aid systems. These funds are to be used for the purchase of right-of-way, for utility relocation, and for construction.

3. It provides that funds are to be apportioned to the states for the first three years (1957-1959) on the basis of population, post-road mileage, and area (as under previous legislation); after 1959 funds are expected to be apportioned for the Interstate System on a needs-basis, depending on the percentage of interstate mileage not completed in each state.

4. It increases the Interstate Highway system from 40,000 to 41,000 miles. Since passage of the Act, an additional 12,000 miles have been recommended by the states for inclusion in the system. The route between Salt Lake City and Denver, Colorado (U.S. Route 40) is typical.

5. It imposes conditions of the Davis-Bacon Act on minimum wage rates for construction of the Interstate System. Some members of the House of Representatives have recently suggested that the cost of administration of this section should come from highway funds. Others contend it should come from the Department of Labor budget.

6. It places size and weight limitations on vehicles using the Interstate Highways (96 inches in width, 18,000 lb. single-axle load, 32,000 lb. on tandem-axles, and maximum gross weight of 73,280 lbs., or the limits in effect in each state on July 1, 1956 - whichever is the higher). Federal Aid Funds may be withheld from states exceeding these limits.

7. The law provides for financing the program on a pay-as-you-go basis from a special Highway Trust Fund into which will be placed approximately \$38.5 billion from certain new and existing highway-user tax revenues over a 16 year period (1956-1972). About \$25.1 billion is to be expended on the Interstate System and \$13.4 billion on the other Federal Aid systems by 1970. The latter figure assumes expenditures of \$900 million per year during the program. Increased or new taxes will provide \$14.8 billion and are levied on gasoline, diesel, and special motor fuels (from 2¢ to 3¢ per gal.); tires (5¢ to 8¢ per lb.); camelback (0 to 3¢ per lb.); new trucks, busses, and truck trailers (8%

to 10% of manufacturer's price); and vehicles over 26,000 pounds gross weight (new tax of \$1.50 per 1000 lbs. of taxable gross weight).

8. It establishes a \$30 million emergency fund for repair and reconstruction of federal-aid highways damaged by such acts of nature as floods, earthquakes, and hurricanes.

9. It provides that the Territory of Alaska, for the first time, will share in the funds for primary and secondary roads. Road construction responsibility in Alaska is removed from the Secretary of the Interior and placed under the Secretary of Commerce.

ADMINISTRATION OF 1956 ACT

The administration of this huge construction program is the responsibility of the Federal Highway Administrator. This is a newly created sub-cabinet post under the Secretary of Commerce. Bertram D. Tallamy, former Chairman of the New York State Thruway Commission, assumed this post in January 1957 and is directing the program through the Bureau of Public Roads. The roads are to be designed and constructed under the supervision of the State Highway Departments in accordance with the approved standards for interstate routes.

PENDING STUDIES:

To facilitate future planning and to guide the administration of the highway program, Congress, through the Federal Highway Act of 1956, required that the Bureau of Public Roads investigate several major problem areas. The areas to be investigated and the dates the reports must be submitted to Congress are as follows:

Due January 1958 - A more accurate estimate of the cost of completing

the Inter-State System. This will determine apportionments to states for 1960-1962. New estimates are required at intervals through 1968. In 1956, a sum of \$27-28 billion in federal and state funds was estimated to be adequate for completing the Interstate network, but recent trends indicate that it will be higher. Some reports now indicate an increase of 100 percent.

Due January 1958 - A study to aid Congress in establishing policy for the reimbursement of States for highways constructed in the period 1947-57 and included in the Interstate System. This is to include toll roads and free roads, if constructed to the approved standards.

Due March 1959 - An incremental cost study to determine the cost of building roads to meet demands of various classes and types of users. This will assist Congress in making an equitable distribution of the tax burden among various classes of vehicles using the federal aid highways or otherwise deriving benefits from them.

Due March 1959 - A study to determine the maximum desirable sizes and weights of vehicles.

Due March 1959 - A study to determine what the Federal Government can do to increase highway safety with emphasis on finding the causes of accidents and their bearing on road construction.

BUREAU OF PUBLIC ROADS STUDIES AND OTHERS

These directives are currently being studied by the Bureau of Public Roads. In addition, several other studies have been initiated by other agencies, and these will assist the Bureau of Public Roads in completing their studies in the required time. The \$19.2 million test

road project at Ottawa, Illinois sponsored by the American Association of State Highway Officials will study the action of single and tandem axle loads of varying intensities on rigid and flexible pavements and on 16 types of test bridges. The test will attempt to correlate highway design and highway cost with the size and weight of the vehicles. It will also attempt to provide criteria for the economical design of new pavements and to evaluate existing facilities. Approximately 50 percent of the construction of the project, including all grading, was completed in 1956. In early 1957, paving will be completed and the testing schedule will be placed in operation. The data from the AASHO test will be used in conjunction with the data from a study of vehicle cost being made by the Highway Research Board's Committee on Economics of Vehicle Size and Weight. These data, which will not be available until 1959, will be used in determining the lowest total overall cost of highway transport facilities.

An investigation begun by a Special House Subcommittee on Highway Safety is expected to complement the Safety Studies by the Bureau of Public Roads.

DEVELOPMENT OF ROADS AND STREETS:

During 1956 highway building continued at an accelerated pace, particularly in urban areas, and more of the larger cities turned to expressways for the solution to their congestion problem. More of these facilities will radiate from urban areas and will connect with the Interstate System. The highway mileage in this country includes 365,000 miles in urban areas. The mileage of city streets has increased 3.1 percent since 1955 and 34 percent since 1921. The total rural

mileage of 3.03 million miles has increased slightly since 1955, and only 3.7 percent since 1921. Thus, on a percentage basis, urban mileage is increasing far more rapidly than rural mileage. Urban mileage is expected to increase as urban areas continue to spread rapidly with vast increases in population and with the trend toward suburban living.

SOME BASIC PROBLEMS:

The Highway System - Of the total 3.4 million miles of highways, only 742,000 miles are on designated Federal Aid systems and thus eligible for financial assistance from the Federal Government. This leaves about 2.7 million miles of highways (including some which should be abandoned) which must be maintained and improved under normal state and local programs. Increasing mileage eligible for federal aid would mean increasing the responsibility of the Federal Government for highway financing. In the minds of some people, this would mean additional federal control.

Decentralization of Federal Authority - The Federal Government, through the Bureau of Public Roads, recently established administrative procedures to expedite the new highway program by decentralizing authority. Authority has been given to field offices to approve:

1. Detailed location of highways on the Interstate System between cities or towns which have been established as control points by the Washington office.
2. All details relating to the location of the primary and secondary road systems.
3. Specific projects proposed by the States for construction under the Federal-Aid highway program.

4. Formal agreements between the States and the Federal Government for each Federal-Aid project. Such agreements reserve Federal funds for the Federal share of the cost of the project.

It is obvious that decentralization of authority and responsibility, when operated within the framework and intent of the law and its broad concepts, will expedite the production of an effective highway system. It is also obvious that local pressure on field offices may have a significant effect upon the development of the highway system. How well the states will work under the new procedure remains to be determined.

Need for Planning - To insure the completion of this 15 year construction program in the allotted time and to insure as much as is possible, the continued usefulness of these facilities after the 15 year period, adequate long range plans must be developed. The Interstate System is being designed to accommodate traffic forecast for 1975 and to allow for expansion after that date. The challenge ahead is one for unlimited imagination. The engineer must join hands with professional planner to most effectively develop transportation of all kinds in metropolitan and urban areas. The highway engineer by joining hands with planner, can leave to the planner the responsibility for decisions on problems outside of the highway engineer's field of specialization. The decisions on these problems may have a far reaching impact on the economy.

State Financing - Another important financing problem today concerns the ability of the states to meet matching fund requirements for the new program and to meet normal funding requirements on non-federal-aid routes. Many cities, particularly those which were unable

to meet available matching funds under previous federal legislation, are finding it necessary to improve or adopt additional means of raising the required funds. Some states have obligated all of their 1957 Interstate funds and over 50 percent of their 1958 allocation. The intent of the 1956 Federal Aid Highway Act is to complete the highway system by 1970 and the states will be encouraged to improve their ability to meet their financial responsibility.

Increased fuel taxes and license fees have been proposed. Eleven legislatures in their 1957 sessions have studied gas tax increases: Arizona, from 5 to 6 cents; Arkansas, 6.5 to 7.5 cents; Indiana, 4 to 6 cents; Maryland, 6 to 8 cents; Nebraska, 6 to 8 cents; New Hampshire, 5 to 6 cents; North Dakota, 6 to 8 cents; Ohio, 5 to 6 cents; South Dakota, 5 to 6 cents; Utah, 5 to 6 cents; and Wyoming, 5 to 6 cents.

In Connecticut and Iowa temporary increases were recently made permanent. Increases have also been recommended in New Jersey, from 4 to 6 cents; Vermont, 5.5 to 8 cents; and New York, 4 to 5 cents. In addition, increased fuel taxes have been proposed in California, Massachusetts, and Mississippi. In all states where gasoline taxes are being considered, similar increases are proposed for special fuels, except in Arkansas, South Dakota, Nebraska, Utah, and Wyoming, where special fuel increases are greater.

In some states (Virginia and Kentucky) higher fuel tax rates were adopted in 1956 for vehicles having over two axles. In addition, mileage tax bills were introduced in ten state legislatures in early 1957.

Some local governments are imposing motor fuel taxes for maintenance and matching fund purposes. One community (Chicago) has

proposed a motor fuel tax to subsidize mass transportation.

Increases in the cost of motor vehicle registration and driver licenses have been made in many states. It is significant to note that legislation to increase driver's license fees was introduced in 20 state legislatures early in 1957. As the number of motor vehicles and driver's licenses increase, the funds available from these sources become more impressive.

The public, especially the highway user, objects to paying increased highway user imposts at the state and national level. The average motorist is currently paying less than one cent in highway user imposts for each mile of travel on the highway. The typical highway user spends \$600 to \$1000 per year in fixed and variable motor vehicle operating costs; less than 10 percent goes into the road he travels. The typical highway user has not been adequately informed of the economy of good highways - savings in operating costs and reduction in accidents. In many states, highway user imposts are and will remain inadequate unless appropriate financial programs are developed.

Some states have placed increasing importance on guaranteeing that all highway user tax revenues will be used for highway improvement purposes only. Motor vehicle fund anti-diversion constitutional amendments have been passed in several states and proposed in more. Delaware, Maryland, New Jersey, New York, Rhode Island, South Carolina and Virginia made such proposals in 1956; while Louisiana and Montana became the 26th and 27th states to adopt such an amendment.

Federal Financing - The states are not alone in their funding problems, for the Federal Government may encounter some shortages in the

Highway Trust Fund (Section 209 of the Act) during the new program. Although an anticipated \$38.5 billion will go into the trust fund over the 16 year (1957-1972) period, a deficit may exist at times. In fact, a recent report by the U.S. Treasury Department shows that 16 years will be required to accumulate sufficient funds to meet total apportionments contemplated. Some additional financing may therefore be needed, especially if reimbursement is made for acceptable interstate routes and toll roads constructed between 1947-1957, and if highway construction costs continue to move upward. Instead of completing the program in 13 years as contemplated, current evidence indicates a longer construction program.

Reimbursement for Highways - The subject of reimbursement for highways (free roads and toll roads) meeting Interstate standards is debatable. A recent survey conducted by Engineering News Record shows that five experts do not favor reimbursement and seven experts favor such action.

If the idea of reimbursement is favored, the main problem will be what formula to use to determine the amount of reimbursement. It has been suggested that reimbursement will involve the establishment of the present value of the highways on the basis of historical costs less an amount for depreciation, but considering cost for maintenance and repair. In some cases the differences between the 90 percent contribution and the previous contribution ranging from 50 to 60 percent would need to be determined. In addition, the type of reimbursement must be considered. It is obvious that this problem of repaying the states is complicated and that a successful and impartial formula will not be found with ease.

But an answer must be found by the Bureau of Public Roads by January, 1958.

How Much Will Highway Costs Change in the Next 13 Years? - It is conceivable and probable that by 1959 costs will have risen to a point where more money definitely will be needed than was originally planned. Because the program envisions a specific amount of road construction, which may be increased as demands increase for more mileage in the Interstate System, more money will undoubtedly be appropriated.

Rising costs for materials and labor have already become apparent. Current fragmentary information indicates the 1956 financing plan may be inadequate. A 1957 study of a number of well-scattered states indicates that new cost estimates for the total highway system are going up 75 to 100 percent, or more, higher than the 1954 state-by-state estimates on which the financing program was established. Examples of increased estimates presented by the Engineering News Record study are: Nevada, up 100 percent; Montana, up 70-80 percent; Texas, up 75 percent; Nebraska, up 70 to 85 percent; Pennsylvania, up 100 percent; California, and Ohio, up sharply an unknown amount. Highway construction costs are higher now than in 1954, but not that much. The Bureau of Public Roads puts the nation-wide average of construction cost increase at 10 percent more than in 1954. Engineering News Record has reported rises ranging from 12 to 42 percent in 13 states, with Montana leading.

Among the questions which might be asked about these differences in cost are:

1. Were the estimates made in 1954 inaccurate because they were hurriedly done?
2. Were the 1954 estimates unrealistic because economic conditions

were effecting the cost estimates?

3. Do we have adequate cost information?
4. Do the 1957 cost estimates appear to reflect an interest on the part of states to report "needs" which are high so that each might receive an adequate share of the federal funds?
5. Do the 1957 bids reflect a competitive market?

The answer to each question might be in the affirmative. But an affirmative answer to the fourth question has certain implications, which need investigation. Congress in its next session will be presented with several choices. Will Congress accept a drastic reduction in program mileage, will it vote more money, or will Congress agree to a reduction in standards?

There may be a tendency in 1957 for fewer contractors to bid, and to bid high, on a given contract when contracts are plentiful. The law of supply and demand will probably operate to increase bid prices in the near future, at least until more contractors seek to take advantage of the increased volume of highway work.

Personnel - Another major problem of the new construction program is that of qualified engineering personnel in the highway departments. About 32,000 engineers are employed by the State (21,000 in State Highway Departments in 1956), county and City Highway Departments. Less than 1000 Civil Engineers enter the highway field each year. To obtain maximum use of professional personnel, several programs have been inaugurated by the various states. Nearly all states, in varying degrees, use photogrammetric techniques for mapping, site investigation, and earthwork computations. Some states are turning to electronic devices

such as radios in communication, seismological equipment in bridge site location, and high speed digital computers to decrease time and cost of computations. All states are following programs of training supporting personnel for use on routine projects, thus permitting the engineer to be free for more professional tasks. But the number of technicians is inadequate, the ratio of technicians to engineers was only 1.4 in 1956. Some states have established educational programs to provide technicians. Extensive programs are also being developed in California, Illinois, and Indiana. The latter states are planning to train nearly 200 technicians in 1957.

Right-of-Way - Advance acquisition of right-of-way for the Interstate System, with its political and legal problems, is presently causing difficulty in some states. It has been one of the real bottlenecks in activating the program. A good public relations program could do much to hold down the cost of land acquisition. The incorporation of controlled access and wide right-of-way features into the design standards of the Interstate System at a cost of \$5 billion finds only 16 states in April 1957 having laws specifically authorizing the acquisition of lands for future highway use. About one half of the states do not have legislative sanctions or judicial precedent to provide assurance that possession of highway right-of-way can be obtained even now, when it is needed. During 1956 legislation for control of access was approved in Alabama, Mississippi, South Carolina, and Delaware, and many other state legislatures have moved in this direction in 1957. In 1956, California and New York were the only states having revolving funds for advance land acquisition. A recent survey shows at least 18

states are currently considering control-of-highway-access legislation and that legislation is pending in 11 states which would deny the use of controlled access rights-of-way for the establishment of service facilities or other commercial facilities. These bills would authorize the construction of service roads so as to facilitate the establishment of competitive enterprises to serve highway users without impairing the effectiveness of the highway for carrying much fast moving traffic.

In recent testimony before Congress, General Prentiss of the American Road Builders Association urged that a federal right-of-way revolving fund be set up in order to put more money into the construction aspects of the program sooner. The fund would permit the Federal Government to pay all of the cost of advance right-of-way acquisition, when requested to do so by the states. The states could then reimburse the fund as the road is built.

Relocation of Public Utilities - The relocation of public utilities is closely associated with the Right-of-Way program. Every dollar spent by highway departments for relocation of public utilities means less money for highway construction. The program may lose an estimated \$2 billion if highway departments are required to pay for relocation. Many highway administrators will object seriously to this diversion of funds for utility reimbursement. This loop-hole in the basic law may be plugged by supplementary legislation at the national and state level. The Governor of Wyoming recently vetoed a bill which would have required the State Highway Department to pay for relocation of utilities made necessary by highway improvements. Similar legislation has been introduced in over half of the states. It has been defeated in

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eleven states, is awaiting action by the governor of three states, and enacted in seven states.

The Billboard Problem - In Congress, a pair of proposals demanded strict federal controls over billboards along the new Interstate System. Both proposals have the same basic objective: to keep all but essential signboards at least 500 feet from the new highways. Under both plans, the Federal Government would be responsible for controlling all Government-owned land, would also "encourage" states to control the land they own. One plan would help the states by authorizing the Federal Government to pay 90 percent of the cost of buying up the advertising rights beyond the highway rights-of-way. This plan would withhold 5 percent of the Government's 90 percent share of construction costs from states that fail to pass restrictive legislation. The Bureau of Public Roads has predicted that it would cost an average of \$6000 per mile to acquire a 750-foot advertising easement. Construction costs have been estimated at \$700,000 per mile. Thus a state would lose \$35,000 (5 percent of \$700,000) in federal aid if it declined to spend \$6,000 a mile for easements. The other main difference: one plan would ban all billboards but those at turnoffs, while the other plan would also permit billboards in industrial or commercial areas along the highway.

The pro-billboard faction argues that such a ban would hit the advertising industry hard, would cripple many businesses whose customers are largely motorists (Motels - 100 percent, hotels - 82 percent, and restaurants - 33 percent). Farmers would lose income from site leases for advertising. Such restrictions may lead to further federal control of advertising and infringe on states' rights. Another good point is

that unless highway planners can provide less monotony, an occasional billboard may be needed as a kind of benzedrine pick-up to keep the drivers from dozing.

The anti-billboard faction argues that the U.S. motorist should not become a captive audience for admen, that the U.S. public itself does not want them along the new roads (Polls range from 66-95 percent against), that signboards increase highway fatalities, and that the Federal Government has the right to protect its investment by attaching proper conditions to its grants-in-aid.

Most experts give a billboard ban only a 50-50 chance of passing. A limited degree of control may come from businessmen who advertise. After listening to a chorus of complaints, California's Union Oil Co. decided last December to cancel its entire \$1 million outdoor-advertising program.

The matter of states' rights may defeat anti-billboard legislation at the national level. Current literature indicates that states' rights are heavily involved and that they are not interested in giving the federal government additional power.

Mass Transportation - Another problem of considerable consequence in all major cities is the decline of mass transportation. In 1955, mass transit rides in the United States were about half the number in 1946. Surface lines in 1955 carried about 9.7 billion passengers and rapid transit carried 1.9 billion passengers. Preliminary estimates show that the number of passengers using surface lines decreased over 6 percent in 1956. Passengers using rapid transit increased about 1 percent. The 1956 increase in rapid transit represents the only annual increase since

1946. During 1956, more than 50 cities in the United States lost their local transit lines. With the mass transit decline, there has been a corresponding increase in passenger car miles in urban areas. Most large cities have found it necessary to turn to controlled access expressways and huge 'downtown' parking facilities to ease the congestion. The \$1.5 billion, 258-mile expressway system in the Detroit, Michigan area and the \$11 million, 3,600-car parking garage under Boston Commons in Boston, Massachusetts are typical examples of such facilities. Private investment in parking lots and garages in 1956 was over \$4 billion.

Highway Safety - In 1956, the number of persons killed on the nation's highways was 40,000. This represented a 4 percent increase over 1955, and an economic loss of \$4.75 billion. This figure does not consider increased insurance premiums. The total fatalities for 1966 are expected to be over 54,000, representing an economic loss of \$6.3 billion. It is estimated by the Automotive Safety Foundation that completion of the Interstate Highway System with its many safety features will save 3,500 lives per year.

The lack of uniformity among states in their laws relating to rules of the road, often listed as a source of danger to the motorist, received very little attention during 1956 as budget matters were of prime concern. Certain uniform code provisions pertaining to lights were adopted in Louisiana, Mississippi, Rhode Island, Virginia, and Pennsylvania.

The November Conference of Governors issued a declaration recommending the enactment of uniform traffic laws, vehicle inspection, driver education, speed regulation, severe punishment for drunken drivers,

better traffic courts and more police at all state levels.

The Governors' report was endorsed by the President, who recommended action on it. The National Safety Council and the American Bar Association have given approval. Both agree to the necessity for an increase in tax supported state and local accident control programs. A billion dollar safety program is necessary to balance the highway program and cope with tomorrow's traffic.

Effective February 1, 1957, all persons under 18 in Michigan must have passed an approved course in driver education to be licensed to drive. Thus Michigan became the first state to make driver training a prerequisite for licensing drivers who must be at least 16 years old. The program is financed by fees collected from driver licenses, from operators, and from chauffeurs and placed in a special training fund.

Improvements in motor vehicle design can be expected to reduce the accident problem. For example, improvements in tail light design and turn-signals may be expected to reduce the number in rear-end collisions and those at intersections.

Motor Vehicles: - During 1956, the automotive industry invested some \$2 billion in new production and office facilities and produced about 5.6 million motor vehicles. This multi-billion dollar industry placed 10.5 million vehicles on the highways in 1921; and over 65 million in 1956. In 25 states, registrations were expected to exceed one million with California's total of 6,557,000 the highest. The increase in the passenger car field was the largest with a total registration of 54,300,000 representing a 4.1 percent increase over 1955. The 10,975,000

trucks and busses registered showed a gain of 3.7 percent over 1955. The trend toward increased horsepower and heavier allowable axle loads continued as new truck models featured more powerful engines, both diesel and liquified petroleum gas, and trailers of greater hauling capacity.

Sizes and Weights of Vehicles - The passage of the Federal Highway Act of 1956 with its size and weight restrictions on vehicles using the Interstate System appears to impose a practical limit on the future increase in truck size and weight. But during 1956, increases in size or weight limitations for certain classes of vehicles were passed in several states (Delaware, Georgia, Kentucky, Michigan, Mississippi, New York, Pennsylvania, South Carolina, and Virginia). Proposals to liberalize motor vehicle size and weight limits have been introduced in the legislatures of 31 states this year, a survey by the National Highway Users Conference reveals. The studies being conducted by the Bureau of Public Roads and the Highway Research Board may have a significant effect upon the matter of sizes and weights in relation to the economics of highway transportation.

Expenditures for Highways - Total direct expenditures for highway purposes continued to increase to an estimated \$8.2 billion in 1956, an increase of \$800 million over 1955 and \$1.7 billion over 1954. The estimated capital outlay expenditures on all roads and streets was \$5.5 billion, exceeding the 1955 total by \$600 million. Interest payments, reflecting the post war use of credit financing for highway construction, were \$333 million, \$39 million more than in 1955.

Toll Revenue Bonds - The issuance of toll revenue bonds, which fell off sharply in 1955 increased to \$1.3 billion in 1956. This raised the total estimated bond issues in 1956 to about \$2.2 billion, \$1 billion more than 1955 but \$500 million less than the peak reached in 1954. The bond issues raised total receipts to \$8.7 billion in 1956, \$1.5 billion more than in 1955, but only \$500 million more than in 1954. Of the total receipts in 1956, highway user state and local imposts included \$3.8 billion; toll revenues, \$307 million; and Federal contributions exceeded \$1 billion for the first time. The highway debt outstanding by the end of 1956 was expected to exceed \$11.4 billion of which \$6.5 billion represents toll facility bonds. Despite these overall increases in bond issues during 1956, the rise in interest rates caused several rather large bond issue proposals, such as the \$54 million turnpike bond issue in Connecticut, to be withdrawn from the market. Many projects which were conceived before the unexpected fade-out of the cheap money era were met with depressed bond prices, due to both the rising interest rates and a general lack of interest on the part of the investor. Credit financing is currently being considered in at least ten states (Delaware, Maine, Maryland, New Hampshire, New York, Oregon, Tennessee, Texas, Vermont and Washington) to provide or continue accelerated highway programs and, in some cases, to increase available federal-aid matching money. Credit financing will continue to expand, however, as pay-as-you-go proponents find that price increases exceed savings in interest payments on bond issues, and as early use of roadway facilities becomes more and more critical in the face of peak

traffic volumes and early revenue returns.

Toll Facilities - Toll Road mileage continued to expand in 1956, but the passage of the Federal Highway Act of 1956 made future toll road construction somewhat uncertain. With the prospect of increased Federal Aid, many states were able to convert proposed toll facilities to free routes. Roads, toll or free, on the Interstate System must be under construction by 30 June 1957 in order to be eligible for consideration for reimbursement under this Act. This presents an additional complication. Proposed toll roads received some boost from the knowledge that Federal funds may be used for approaches to toll routes on the Interstate System if a free by-pass is available and if the toll road will become a free road upon liquidation of the bonds.

During 1956 the toll facilities opened were: the Indiana East-West Turnpike (156 miles), Kansas Turnpike (236 miles), Massachusetts East-West Turnpike (123 miles), Kentucky Turnpike (40 miles), Newark Airport (8.1 miles) and Pennsylvania Turnpike Extension (6 miles) of the New Jersey Turnpike, Northeast Extension of the Pennsylvania Turnpike (37.2 miles), and several additional sections of the New York State Thruway. Including these new routes, a total of 2561.9 miles of toll roads in 16 states were in operation at the end of 1956; in addition, 10 states had 735.5 miles of turnpike under construction. Many other states have toll roads in various stages of development varying from initial planning to final authorization of the bond issues. During the past year toll road plans have been abandoned or postponed in Maryland, North Carolina, Virginia, Ohio, West Virginia, Oklahoma, Kansas, Georgia, Texas, Washington, and Pennsylvania.

In general, earnings from toll facilities increased about 10 percent during 1956. However, the West Virginia Turnpike is still experiencing financial difficulties, earning only 55 percent of the required revenues. The newly opened Kentucky Turnpike fell 10 percent short of debt expenses for its first 3 months of operation. The Pennsylvania Turnpike is running below estimated revenue on several turnpike sections and a \$400 million refinancing proposal to have the paying sections pay for the less remunerative ones is being considered. The New Jersey Turnpike, however, is earning revenue at a rate not expected for 15 years and may be retained as a toll road to produce funds for the construction of free roads within the state.

Creation of toll road authorities is currently under consideration in California, Colorado and Missouri. Additional toll roads and extensions to existing toll roads have been proposed in Connecticut and Pennsylvania. Proposals to repeal existing authorities have been submitted in Iowa and Michigan. Washington has repealed its toll road enabling legislation.

DEVELOPMENTS OUTSIDE THE UNITED STATES:

An estimated \$648 million was spent in Canada during 1956 on roads and bridges. This is a 28 percent increase over 1955 expenditures. In 1956 the Federal Government of Canada passed an Act agreeing to pay 90 percent of the cost of 10 percent of the mileage of the Trans-Canada Highway in each province in order to accelerate completion of the remaining sections. This will increase the Federal contribution from \$150 to \$250 million for the program. The Trans-Canada Highway, originally scheduled for completion in December 1956 is now due to be completed by 31 December

1960. Quebec, which did not sign the original agreement, will not participate in the new program. In British Columbia selection of the Rogers Pass Route for the Trans-Canada Highway resulted in a mileage reduction of 100 miles, giving a total length of 4,470 miles of highway from St. John's to Vancouver (Quebec not included). At the end of 1956 about 2668 miles of this route had been paved. In other sections of Canada, construction is continuing on a four-lane \$17 million tunnel under the Fraser River in British Columbia between Vancouver and the U.S. border. Construction is also proceeding on the Lake Shore Expressway in Toronto and on the Burlington Beach Skyway, a key link in the 96 mile expressway from Toronto to Fort Erie, on the U. S. border.

In Central America the 1,573 miles of the Pan-American Highway from the Mexican border to Panama City are expected to be completed by 1958. Of this total mileage, 548 miles of highway are paved, 852 miles are of all weather construction, and 173 miles are impassable. New construction or improvements are in progress on 528 miles of road and construction is scheduled in 1957 on 319 additional miles. Of the total available United States Funds of \$74,980,000 to date, about \$62,980,000 have been appropriated to date for construction purposes. The United States contributes $\frac{2}{3}$ of the construction costs and the Central American Republics $\frac{1}{3}$. The Darien Gap between Chepso, Panama and Carli, Columbia is the last major obstacle in Central America. Surveys are being made to push this \$70 million link through the unexplored jungle, where permanent cloud banks make aerial surveying impossible. All member countries of the organization of Central American states have signed a treaty permitting free and unlimited passage of automobiles across their borders.

In April, 1956, Peru opened a 720 ft. suspension bridge at Corral Quemado to provide a vital link in the Pan American Highway. Brazil has presented a proposal to extend the Pan American Highway from Rio de Janeiro 2500 miles westward to tie into the Columbian Road Network at an estimated cost of \$100 million. Also in Brazil, the Export-Import Bank has agreed in principle to finance the major foreign exchange costs of a new development plan which includes \$70 million for 10,000 kilometers of new roads and paving of 3200 kilometers of existing road. In Venezuela, an estimated \$45 million is to be spent on a combination bridge and tunnel to span the Lake Maracaibo Straits.

SUMMARY

Thus, 1956 will be regarded as a mile post in highway development in North America. The challenge ahead is one for unlimited imagination and the highway engineer must join hands with the economist, the planner, the sociologist, the financier, and other disciplines if the job is to be done economically and efficiently.

HIGHWAY HIGHLIGHTS OF 1966 AND THE CHALLENGE AHEAD

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